

Claims

- Sub B1
1. A DNA sequence encoding a mitogenic cyclin or encoding an immunologically active and/or functional fragment of such a protein, selected from the group consisting of:
- (a) DNA sequences comprising a nucleotide sequence encoding a protein comprising the amino acid sequence as given in SEQ ID NO: 2;
 - (b) DNA sequences comprising a nucleotide sequence as given in SEQ ID NO: 1;
 - (c) DNA sequences hybridizing with the complementary strand of a DNA sequence as defined in (a) or (b);
 - (d) DNA sequences encoding an amino acid sequence which is at least 70% identical to the amino acid sequence encoded by the DNA sequence of (a) or (b);
 - (e) DNA sequences, the nucleotide sequence of which is degenerated as a result of the genetic code to a nucleotide sequence of a DNA sequence as defined in any one of (a) to (d); and
 - (f) DNA sequences encoding a fragment of a protein encoded by a DNA sequence of any one of (a) to (e).
2. A method for identifying and obtaining mitogenic cyclins comprising a two-hybrid screening assay wherein CDC2a as a bait and a cDNA library of a plant cell suspension as prey are used.
3. The method of claim 2, wherein said CDC2a is CDC2aAt.
- Sub B2
4. A DNA sequence encoding a mitogenic cyclin obtainable by the method of claim 2 or 3.

5. A nucleic acid molecule of at least 15 nucleotides in length hybridizing specifically with a DNA sequence of claim 1 or 4 or with a complementary strand thereof.
6. A vector comprising a DNA sequence of claim 1 or 4.
7. The vector of claim 6 which is an expression vector wherein the DNA sequence is operatively linked to one or more control sequences allowing the expression in prokaryotic and/or eukaryotic host cells.
8. A host cell containing a vector of claim 6 or 7 or a DNA sequence of claim 1 or 4.
9. The host cell of claim 8 which is a bacterial, insect, fungal, plant or animal cell.
10. A method for the production of a mitogenic cyclin or an immunologically active or functional fragment thereof comprising culturing a host cell of claim 8 or 9 under conditions allowing the expression of the protein and recovering the produced protein from the culture.
11. A mitogenic cyclin or an immunologically active or functional fragment thereof encodable by a DNA sequence of claim 1 or 4 or obtainable by the method of claim 2, 3 or 10.
12. An antibody specifically recognizing the protein of claim 11 or a fragment or epitope thereof.
13. A method for the production of transgenic plants, plant cells or plant tissue comprising the introduction of a DNA sequence of claim 1, 4 or 5 or a vector of claim 6 or 7 into the genome of said plant, plant cell or plant tissue.

14. The method of claim 13 further comprising regenerating a plant from said plant tissue or plant cell.
15. A transgenic plant cell comprising a DNA sequence of claim 1 or 4 which is operably linked to regulatory elements allowing transcription and/or expression of the DNA sequence in plant cells or obtainable according to the method of claim 13 or 14.
16. The transgenic plant cell of claim 15 wherein said DNA sequence or said vector is stably integrated into the genome of the plant cell.
17. A transgenic plant or a plant tissue comprising plant cells of claim 15 or 16.
18. The transgenic plant of claim 17 in which plant cell division and/or growth is enhanced and/or wherein the plant is less sensitive to environmental stress compared to the corresponding wild type plant.
19. A transgenic plant cell which contains stably integrated into the genome a DNA sequence of claim 1, 4 or 5 or part thereof or obtainable according to the method of claim 13 or 14, wherein the transcription and/or expression of the DNA sequence or part thereof leads to reduction of the synthesis of a mitogenic cyclin in the cells.
20. The plant cell of claim 19, wherein the reduction is achieved by an antisense, sense, ribozyme, co-suppression and/or dominant mutant effect.
21. A transgenic plant or plant tissue comprising the plant cells of claim 19 or 20.
22. The transgenic plant of claim 21 which displays a deficiency in plant cell division and/or growth.

23. Harvestable parts or propagation material of plants of any one of claims 17, 18, 21 or 22 comprising plant cells of claim 15, 16, 19 or 20.
24. A method for identifying and obtaining an activator or inhibitor of cell division comprising the steps of:
- (a) combining a compound to be screened with a reaction mixture containing the mitogenic cyclin of claim 11 and a readout system capable of interacting with the mitogenic cyclin under suitable conditions;
 - (b) maintaining said reaction mixture in the presence of the compound or a sample comprising a plurality of compounds under conditions which permit interaction of the mitogenic cyclin with said readout system;
 - (d) identifying or verifying a sample and compound, respectively, which leads to suppression or activation of the readout system.
25. A method of producing a plant herbicide comprising the steps of the method of claim 24 and formulating the compound obtained or identified in step (c) or a derivative thereof in a form suitable for the application in agriculture or plant cell and tissue culture.
26. A compound obtained or identified by the method of claim 24, which is an activator or inhibitor of plant cell division.
27. A diagnostic composition comprising a DNA sequence of claim 1, 4 or 5, a vector of claim 6 or 7, a protein of claim 11, an antibody of claim 12, or the compound of claim 26, and optionally suitable means for detection.
28. Use of a DNA sequence of claim 1, 4 or 5, the vector of claim 6 or 7, the protein of claim 11, the antibody of claim 12 or the compound of claim 26 for modulating plant cell cycle, plant cell division and/or growth, for influencing the activity of mitogenic cyclin in a plant cell, as positive or negative regulator of cell proliferation, for modifying the growth inhibition caused by

29. Use of the compound of claim 26 as growth regulator and/or herbicide.

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